

Exhibit 18

EXPERT REPORT OF HENDRIK BESSEMBINDER

In the Matter of

U.S. Commodity Futures Trading Commission

vs.

William Byrnes, Christopher Curtin,

The New York Mercantile Exchange, Inc., and Ron Eibschutz

I. SCOPE OF WORK AND QUALIFICATIONS

1. I was asked by the Division of Enforcement of the U.S. Commodity Futures Trading Commission ("CFTC") to examine certain audio recordings, transcripts, and market data series in order to assess the appropriateness and materiality of disclosures of trading information by New York Mercantile Exchange, Inc. ("NYMEX") employees William Byrnes ("Byrnes") and Christopher Curtin ("Curtin") to Ron Eibschutz ("Eibschutz"). In particular, I was asked to opine on whether the information disclosed in the audio recordings would, if known to other traders, be considered important in deciding whether to make investment or trading decisions. I was not asked to assess whether Eibschutz or others did make use of the disclosed information in their trading decisions, as the requisite data to make such an assessment is not available to me. This section of my report outlines my qualifications to assess those issues that the CFTC did request of me.

2. I am a Professor of Finance, and holder of the Francis J. and Mary B. Labriola Chair, at the W.P. Carey School of Business of Arizona State University. I am also an Affiliate Professor of Finance at the Foster School of Business of the University of Washington. I previously held faculty positions at the University of Utah, Emory University, and the University of Rochester. I have taught courses in Financial Management, International Finance, Financial Markets, and Futures and Options, in undergraduate, masters, and doctoral programs. My research, which has consistently been published in the most prominent peer-reviewed Finance journals, focuses on financial and commodity markets, including stock markets, bond markets, foreign exchange markets, futures markets, and energy markets. The majority of my published research considers various aspects of trading, including market rules, trading strategies, trading

costs, price impacts, order submission strategies, market liquidity, etc. Of particular relevance to these proceedings, I have published studies focused directly on the topic of "market transparency," i.e., on the release of information about market trades and market conditions.

3. I hold a Ph.D. in Business from the University of Washington, with a major in Finance, and minors in Business Economics, Mathematics, and Research Methods. I serve as Managing Editor of the *Journal of Financial and Quantitative Analysis*, and as Associate Editor of the *Journal of Financial Economics* and the *Journal of Financial Markets*, and I am past Associate Editor of the *Journal of Finance*. In these editorial roles I have evaluated the research design, quality, and importance of several hundred research manuscripts that were submitted to the Journals for possible publication.

4. In addition to my academic duties, I have previously served as a consultant on issues related to financial and commodity markets for private and government clients, including Barclay's Global Advisors, Data Resources, Inc., ProShares LLC, Goldman Sachs, the New York Stock Exchange, the U.S. Department of Justice, the Internal Revenue Service, the U.S. Commodity Futures Trading Commission, the U.S. Securities and Exchange Commission, and the Attorneys General of the States of New York and California, among others. I have been qualified as an expert in trading-related legal proceedings on multiple occasions.

5. The opinions expressed in this report are based on my analysis of the information provided to me, as described in the following sections. I respectfully reserve the right to update and amend my report should additional information become available prior to trial. Appendix A of this report contains a complete listing of my previous testimony in trial or deposition. Appendix B contains a listing of materials I considered in compiling this report. A listing of all

publications I have authored is attached as Appendix C. I am being compensated for my work in this matter at the rate of \$750 per hour.

II. MARKET TRANSPARENCY

6. Financial economists, including myself, use the term "Market Transparency" to refer to the amount and type of information regarding market conditions and market outcomes that is made available to those who are potentially interested in trading. "Pre-trade transparency" refers to information regarding market conditions such as bid and ask quotations or aggregate quantities of unexecuted orders, while "Post-trade transparency" refers to information regarding completed trades, such as transaction price and quantity transacted.

7. Financial markets differ substantially in their transparency. Stock and futures exchanges often disseminate to subscribers data such as aggregate quantities of unexecuted buy and sell orders at various prices, as well as prices and quantities for completed trades. Some stock exchanges in Scandinavia and elsewhere report brokerage firm identification numbers for completed trades, while stock markets in the U.S. do not. Prices and quantities for corporate bond trades completed in the U.S. are reported to the public, but corporate bond trades in Europe are not. Traditional telephone-based dealer markets in foreign exchange, structured financial products (e.g. mortgage-backed bonds), and energy contracts generally do not disseminate any information regarding unexecuted orders or regarding the individual trades that are completed.

8. Individual markets sometimes change their degree of transparency. For example, prior to July 1, 2002, U.S. corporate bond markets did not report trade prices or quantities to the public, but this data is now reported to the public through the Trade Reporting and Compliance

Engine ("TRACE").¹ The New York Stock Exchange began to disseminate aggregate price and quantity data regarding unexecuted orders through its "Open Book" system on January 24, 2002.² Financial markets sometimes choose to reduce the amount of information revealed. For example, the Australian Stock Exchange on November 28, 2005 ceased displaying brokerage firm identifiers on unexecuted orders.³

9. While the degree of transparency selected by financial markets and their regulators differs across markets and over time, there is one constant. To my knowledge, no financial market discloses the identities of the individual traders that submit orders or complete trades to the public at large, or even to those with paid subscriptions to market data services. The fact that no financial market or regulator has adopted a transparency policy that involves the revelation of the identities of the principals involved in individual trades comprises rather strong though indirect evidence that such a degree of transparency is not beneficial to the functioning of markets.

10. The revelation to other parties of the identities of the individuals involved in completed trades raises a number of concerns. The first is with regard to proprietary trading strategies. Traders develop strategies that they hope will be effective in accomplishing their trading objectives, which themselves vary over time and across traders. Some traders attempt to identify and transact in securities that can be traded at a premium or a discount to levels justified by long term fundamentals or by the prices of related securities. Other traders attempt to forecast short term price movements, buying ahead of price increases and selling ahead of price

¹ See H. Bessembinder, W. Maxwell, and K. Venkataraman, "Market transparency, liquidity externalities, and institutional trading costs in corporate bonds," *Journal of Financial Economics*, 82, 2006, 251-288.

² See S. Baruch, "Who benefits from an open limit-order book?" *Journal of Business*, 78, 2005, 1267-1306.

³ See C. Comerton-Forde and K.M. Tang, "Anonymity, liquidity, and fragmentation", *Journal of Financial Markets*, 12, 337-367.

declines. Some simply seek to enter or exit long term investment positions while incurring the lowest possible trading costs. Some seek to enter positions that effectively hedge their underlying risks, while others seek to earn a profit by providing liquidity to the market, while mitigating the risks of doing so. The revelation of the identities of the parties involved in specific trades potentially allows others to infer the traders' objectives and/or their strategies for obtaining those objectives. This concern is heightened in the case of any traders who are perceived by others in the market to be unusually skilled at investment and/or trading decisions.

11. The second concern arises from the potential that others will be able to infer a given trader's short-term trading intentions. Knowledge of the recent trades made by a given trader may allow others to forecast the trader's upcoming orders. For example, if a liquidity-providing trader accumulates a substantial position others may infer that the trader intends to offload the inventory in the near future. Alternatively, if others have learned that a trader who typically accumulates large positions has started to purchase a given asset they may infer that she intends to keep trading in the same direction. It can be profitable to transact simultaneous with or just ahead of another trader's order entry, a practice sometimes referred to as "front running" or "predatory trading."⁴ I have shown theoretically that predatory trading is most damaging in cases where (i) only one or a few others have inferred a given trader's intentions, and (ii) the market involved is relatively illiquid.⁵

12. Third, knowledge of a given trader's overall trading strategies and/or short term trading intentions can provide a competitive advantage to some providers of brokerage or advisory services, at the expense of competing providers of the same services. Normally,

⁴ See M. K. Brunnermeier and L. H. Pedersen, "Predatory Trading", 2005, *Journal of Finance*, 60, 1825-1863,

⁵ See H. Bessembinder, A. Carrion, L. Tuttle, and K. Venkataraman, "Liquidity, Resiliency, and Market Quality around Predictable Trades: Theory and Evidence," 2016, *Journal of Financial Economics*, forthcoming. This paper is available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2026802.

competition should result in order flow being routed to the service providers who can supply quality services at reasonable prices. An advantage deriving from improperly obtained information could distort the normal competitive landscape in the market for ancillary trading services.

13. It should be recognized that, while no financial market has adopted a policy of revealing the identities of the traders who submit orders or complete trades, individual traders have the option to reveal information if they choose.⁶ The fact that most traders do not choose to do so provides strong evidence that they perceive the costs of revealing their trades to exceed any possible benefits, such that the revelation of trading information would be damaging to them.

14. In fact, some traders specifically choose to transact using market structures that are designed at least in part to reduce the likelihood that other traders will learn of their trading intentions and strategies. In the equity markets, so-called "dark pools" have arisen and are mainly distinguished from the "lit" markets such as the New York Stock Exchange by their reduced degree of transparency.⁷ In addition, larger traders have long made use of brokered markets (sometimes referred to as "upstairs" markets) that operate in parallel to standard exchanges, at least in part because such brokered markets can potentially locate counterparties while reducing the degree to which the broad market learns of a trader's intent.⁸

⁶ For example, the United States Oil Fund routinely announces the dates of its upcoming "roll" trades on its web site <http://www.unitedstatescommodityfunds.com/fund-details.php?fund=uso&pagetype=roll-dates&page=fund-details>. Even in this case, though, the Fund does not reveal its specific trades or their timing.

⁷ See, for example, S. Buti, B. Rindi, and I. Werner, "Dark pool trading strategies, market quality, and welfare," *Journal of Financial Economics*, forthcoming (paper available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1571416), who show that dark pools account for more than 14% of stock market activity in the U.S.

⁸ See for example, H. Bessembinder and K. Venkataraman, "Does an electronic stock exchange need an upstairs market?" *Journal of Financial Economics*, 2004, 73, 3-36.

III. IMPROPRIETY AND IMPORTANCE

15. I view the disclosure of information regarding completed trades to be improper if such disclosure is prohibited by the rules and regulations of the markets involved, and if the traders involved did not consent to the disclosure.

16. I view a disclosure of information, including information about specific executed trades, to be important if there is a substantial likelihood that the disclosure, had it been known to him or her, would be considered important to the trading decisions of an economically rational trader. A disclosure can potentially alter trades in the immediate aftermath of its occurrence, e.g. if another party uses the information to forecast and trade ahead of the upcoming trades of those whose trading information was disclosed. It can also potentially alter trades in the longer term if another party attempts to mimic the trading strategies of the parties whose trades were disclosed, or if those whose trades were disclosed find that their existing strategies are no longer effective because others have adopted similar strategies.

17. Generally speaking, information disclosures regarding specific trades will tend to be more important if the trades involved are larger. However, a trade need not be large to be important. A given trader may be viewed as skilled, and others may seek to learn about and mimic her strategies, even if her trades are relatively small. Also, predatory or front-running strategies will, other things equal, be more profitable and hence more likely to occur in response to a given disclosure in markets that are less liquid. That is, a trade of a given size might be relatively less important if it occurs in a highly-traded and very liquid market, but could be important if it occurs in a less liquid market.

18. A given information disclosure can be important without being improper. For example, the announcement of quarterly earnings by a publicly-listed firm is a

public event that often prompts trading in its stock by market participants. A disclosure can be important and in my view is improper if it relies on non-public information to confirm a rumor or conjecture that was not previously known to be true.

IV. THE MARKETS AND INSTRUMENTS INVOLVED IN THIS MATTER

A. FUTURES CONTRACTS

19. The NYMEX, which is owned by the Chicago Mercantile Exchange (CME), operates an exchange for the trading of futures contracts and options on futures contracts. A physically-settled futures contract is an obligation to deliver a specified quantity of a specified good at a specified location on a specified future date or dates, for a price (the "futures price") determined at the time the contract is entered. While it is common to refer to buying and selling futures, it would be more accurate to say that traders enter futures contracts. The futures price refers to the price to be paid upon delivery of the specified good in the future, should that event occur, not the price of entering the futures contract itself, which is zero.⁹ Stated alternatively, the futures price adjusts in the marketplace to ensure that both buyers and sellers are willing to enter the contract without paying or being paid to do so.

20. Ignoring for simplicity any costs of trading, shipping or warehousing the good, a trader who buys a single futures contract (also referred to as taking a "long" position in the contract) and holds it until the delivery date will earn a profit or loss equal to the contract size times the difference between the spot market price at the delivery date and the futures price at the

⁹ A futures trader will typically have to place funds in a margin account upon entering a position. However, the margin is essentially a performance bond to cover potential future losses, rather than a purchase price.

time the contract is entered.¹⁰ A trader who sells a single futures contract (also referred to as taking a "short" position in the contract) will earn a profit or loss equal to the contract size times the difference between the futures price at the time the contract is entered and the spot market price at the delivery date.

21. In practice, the majority of futures positions are closed out or offset prior to maturity. A trader who purchases one futures contract at a given date and offsets it by selling an equivalent contract at a later date will earn a gain or loss equal to the contract size times the change in the futures price from the entry trade to the offset trade. A trader who sells one futures contract at a given date and offsets it by buying an equivalent contract at a later date will earn a gain or loss equal to the contract size times the opposite of the change in the futures price from the entry trade to the offset trade. A long futures position therefore provides profits if the futures price rises after entry and losses if the futures price falls after entry. A short futures position provides profits if the futures price falls after entry and losses if the futures price rises after entry.

22. A given futures contract specifies a delivery month, and contracts with a variety of delivery months are typically traded at any given point in time. A common strategy for futures traders is a "calendar spread" trade, which involves the simultaneous purchase of a futures contract for delivery during a given month and the sale of an otherwise identical futures contract with a different delivery month. For example, a trader might purchase the October futures contract and sell the otherwise-identical December contract. In this case the trader would profit if the difference or "spread" between the October and December prices were to increase

¹⁰ Futures contracts are "marked-to-market" at the end of trading each day, which implies that a portion of the total profit is received or paid on a daily basis. A cash-settled futures contract provides essentially the same profit or loss potential as the equivalent physical delivery futures contract, but can be settled with a cash payment rather than actual delivery of the good.

(or "widen"), and would take losses if the spread were to decrease (or "narrow"). A trader who sold the October futures contract and purchased the otherwise identical December contract would have the opposite profit or loss potential, profiting if the spread narrowed and taking a loss if the spread widened.

23. In light of the fact that profits and losses on futures calendar spreads depend only on the difference between the two futures prices involved, traders commonly refer directly to the difference in the two futures prices, or the spread price, rather than the individual prices. For example, if the September futures price was 46 and the December price was 48, traders would refer to September-December spreads in terms of the spread price, which would be $46 - 48 = -2$.

B. OPTIONS ON FUTURES

24. In addition to futures contracts, the NYMEX offers trading in a broad variety of options on futures contracts. The buyer of an option pays the seller a price that is often referred to as the option "premium." Each option contract specifies an "exercise" or "strike" price. At any given point in time the NYMEX offers options on futures with an array of strike prices. While any qualified trader can enter a futures contract at the current futures price, the owner of a futures option has the right, but not the obligation, to enter the futures contract at the strike price rather than the futures price. A call option allows its owner to enter a long futures contract at the specified strike price, while a put option allows its owner to enter a short futures position at the specified strike price. The NYMEX offers trading in both "European" options, which can only be exercised on their specified maturity date, and "American" options which can be exercised at any time up to and including the maturity date.

25. If the owner of a single call option on a futures contract chooses to exercise the option she can enter the long futures position at the strike price and can immediately offset the

futures contract at the current futures price. The resulting gain or loss is the contract size times the difference between the futures price at the time of exercise and the pre-specified strike price. Of course, since the owner of the call has the right but not the obligation, she would not exercise the option if the difference was negative. The call option therefore gives its owner "upside potential" in the form of increasing profits as the futures price rises above the strike price, but also downside protection arising from the fact that the option need not be exercised.

26. If the owner of a single put option on a futures contract chooses to exercise the option she can enter the short futures position at the strike price and can immediately offset it at the current futures price. The resulting gain or loss is the contract size times the difference between the pre-specified strike price and the futures price at the time of exercise. Of course, since the owner of the put has the right but not the obligation, she would not exercise the option if this difference was negative. The owner of a put option on a futures contract therefore has "downside potential" in the form of increasing profits as the futures price falls below the strike price, but also upside protection resulting from the fact that the option need not be exercised.

27. Futures options are sold (or "written") as well as purchased. The owner is typically referred to as being long the option while the writer is referred to as being short the option.¹¹ The exercise of an option by its owner imposes a loss on the option writer equal in magnitude to the gain realized by the option owner. In particular, while the exercise of a call option on a futures contract allows the call owner to enter a long futures position at the strike price, the call writer is in this case obligated to enter a short futures contract at the strike price. Similarly, while the exercise of a put option on a futures contract allows the owner to enter a short futures position at the strike price, the writer of the put is in this case obligated to enter a

¹¹ Somewhat paradoxically, the owner of a put is long the option but short the underlying future, since the put option provides profits if the underlying futures price drops.

long futures position at the strike price. As the option owner will not exercise unless the gain from their perspective is positive, the option writer will always suffer a loss upon exercise of the option.¹²

C. CALENDAR SPREAD OPTIONS

28. Finally, in addition to options on futures, the NYMEX offers trading in calendar spread options. A calendar spread option is analogous to a futures option, except that the underlying asset is a futures calendar spread (one long futures contract and one short futures contract) as opposed to a single futures contract. Among the more common contracts are one-month calendar spread options (the underlying long and short futures delivery dates differ by only one month, e.g. July and August of the same year) and twelve-month calendar spread options (the underlying long and short futures delivery dates differ by twelve months, e.g. December of the current year and December of the following year).

29. A calendar spread call option gives its owner the right but not the obligation to enter a spread that is long the nearer-to-delivery-date futures contract and short the more-distant-to-delivery-date futures contract at the option exercise price rather than the current spread price. As such, the calendar spread call option has "upside potential" (and downside protection, as it need not be exercised) with respect to the spread between the futures prices of the nearer and more distant delivery contracts.

30. A calendar spread put option gives its owner the right but not the obligation to enter a spread that is short the nearer-to-delivery-date futures contract and long the more-distant-to-delivery-date futures contract, at the option exercise price rather than the current spread price.

¹² Of course, the writer of the option will have been compensated by the earlier receipt of the option premium from the option owner.

As such, the calendar spread put option has "downside potential" (and upside protection, as it need not be exercised) with respect to the spread between the futures prices of the nearer and more distant delivery contracts.

31. Calendar spread options can also be sold, or written, as well as purchased.

Analogous to futures options, a short position in a calendar spread option leads, upon option exercise (if that even occurs) to losses that exactly mirror the gain to the owner of the calendar spread option.

D. HEDGING AND SPECULATION

32. Traders enter commodity futures and options on commodity futures for two broad reasons. First, they may seek to hedge existing exposures. That is, they may own assets or have operating cash flows whose value depends on commodity prices. The traders can enter futures or options on futures that provide exposures to commodity prices that tend to offset the effects on the value of the existing positions. For example, an oil producer has positive or long exposure to crude oil prices, as its revenues increase when crude oil prices rise. This exposure can be hedged by entering a position that has negative or short exposure to crude oil prices, such as a short position in crude oil futures or a long position in a put option on crude oil futures.

33. Second, traders can use futures and options on futures to speculate on the direction of future changes in prices. For example, a long futures contract provides profits if futures prices rise while a short futures contract provides profits if futures prices fall. Similarly, a long call position provides profits if futures prices rise sufficiently to offset the premium paid while a long put position provides profits if futures prices fall sufficiently to offset the premium paid.

34. Option contracts can be combined into a wide variety of portfolios that provide tailored speculative or hedging outcomes. Among the possible option portfolios that can be created, and that are referenced in the disclosures in this matter, are:

- A "Fence" (also known as a "Collar"), which involves the purchase of a put with a given strike price in combination with the sale of a call with a higher strike price (or vice versa). A fence is often used as a hedge of an underlying position. The knowledge that a given trader has entered a fence might therefore reveal information about the trader's other assets or financial positions.
- A "long strangle", which involves the simultaneous purchase of a put with an exercise price below the current futures price and a call with an exercise price above the current futures price. This strategy, which is sometimes also referred to as "buying volatility" is profitable if the futures price either increases or decreases by a sufficiently large amount, and its use by a given trader could indicate that the trader expects market volatility to increase.
- A "short strangle", which involves the simultaneous sale of a put with an exercise price below the current futures price and a call with an exercise price above the current futures price. This strategy, which is sometimes also referred to as "selling volatility" is profitable if the futures price remains close to its existing level, and its use by a given trader could indicate that the trader expects the market to become more stable.

- A "straddle", which is the same as a strangle with the exception that exercise prices are the same for both the put and the call option, and would tend to be used by traders in similar circumstances as a strangle.
- A call "butterfly spread", which involves the purchase of one call with a low exercise price, the sale of two calls with an intermediate exercise price, and the purchase of one call with a high exercise price. The call butterfly spread is profitable if prices remain close to the intermediate strike price but imposes losses if prices make large movements in either direction. Its use might indicate that the trader involved anticipates that markets will become more stable. (A short call butterfly spread is created by reversing the direction of each trade, and generates profits if prices make large movements in either direction, and might be used by a trader who expects market volatility to increase.) Put options can also be used to create butterfly spreads.

E. NOTIONAL VALUES

35. Futures and options on futures allow traders to effectively leverage their capital to obtain larger positions, with greater profit and loss potential, as compared to those that could be obtained by trading in spot markets. As noted, the market price of a futures contract entered at the prevailing futures price is zero, implying that no capital commitment (other than margin required by the brokerage firms) is involved in entering futures contracts. The market value of any given option is positive, but traders can buy or sell (write) options, and many option portfolios that involve both long and short positions can be entered with zero or negligible capital commitment, other than requisite margin.

36. An implication is that it is difficult to assess the economic magnitude of a given trade or of a trader's position based only on the amount of capital committed to the trade. For this reason it is common in derivative markets (futures and options on futures are part of the wider set of contracts that are referred to as derivatives) to compute the "notional" value of trades and positions in order to assess and compare the economic magnitudes involved.¹³ The notional value of a given trade or position is the number of contracts times the contract size times the spot market value of the underlying asset.¹⁴ In Section V below I assess the notional value of several trades, relying in each case on the nearest-to-expiration futures price on the same date as a simple proxy for the spot market value of the underlying asset.

F. THE CONTRACTS INVOLVED IN THIS MATTER

37. The NYMEX offers trading in a variety of futures contracts, including crude oil, natural gas, and gasoline contracts. The NYMEX "CL" contract is a futures contract calling for physical delivery of 1,000 barrels of crude oil at Cushing, Oklahoma. The NYMEX "CS" contract is similar to the CL contract in that it pertains to 1,000 barrels of crude oil, but is financially settled based on the average daily price of the nearest-to-expiration CL contract during the delivery month. The NYMEX "NG" contract is a futures contract calling for the delivery of 10,000 million British thermal units of natural gas at Henry Hub in Louisiana. The NYMEX "RB" contract is a futures contract calling for delivery of 42,000 gallons of gasoline at New York harbor.

¹³ For example, the Bank for International Settlements recently (as of September 2015) estimated the global notional value of exchange-traded interest rate and foreign exchange futures to be \$26.7 trillion, and the global notional value of exchange-traded interest rate and foreign exchange options to be \$35.5 trillion. See <http://www.bis.org/statistics/d1.pdf>.

¹⁴ For example, the CME Glossary, available at <http://www.cmegroup.com/education/glossary.html>, defines Notional Value as "The underlying value (face value), normally expressed in U.S. dollars, of the financial instrument or commodity specified in a futures or options on futures contract."

38. The majority of the information disclosures in this matter focused on trades in options on NYMEX crude oil, natural gas, and gasoline futures contracts. Table 1 lists the contracts for which disclosures were made, along with the approximate number of telephone calls that included disclosures for each contract. Disclosures occurred most frequently for the WA contract, which is the one-month calendar spread option on the CL crude oil futures contract. Disclosures also occurred frequently for the WZ contract (the twelve-month calendar spread option on the CL futures contract), the LO contract (the American option on the CL futures contract), and the AO contract (the European option on the CS crude oil futures contract). In addition, frequent disclosures occurred for a pair of "daily options," including the CD contract (daily option on the CL crude oil future) and the KD contract (daily option on the NG natural gas futures contracts). These NYMEX daily options pertain to the nearest-to-expiration futures contract, and each option trades for only a single day, with cash settlement at the close of trading.

G. NYMEX TRADING VENUES

39. The NYMEX facilitates the trading of futures and options on futures through three distinct mechanisms: the Globex market, the traditional trading floor or "pit", and the ClearPort system.

40. Globex is an electronic limit order market. Limit orders are price-contingent orders for specified quantities. A buy limit order can be executed only if it is matched with a sell order that provides a price equal to or lower than the limit price specified by the trader, while a sell limit order can be executed only if it is matched with a buy order that provides a price equal to or higher than the limit price specified by the trader. The Globex system keeps a record of all unexecuted limit orders (known as the limit order book), and matches buy and sell orders to complete trades when possible. Subscribers can receive continuous information regarding the

aggregate quantity of unexecuted orders at various prices as well as prices and quantities of completed trades. Subscribers do not receive information regarding the sizes or prices of the individual orders in the limit order book, nor do they receive information regarding the identities of the individual traders who submit orders and/or complete trades, or regarding the identities of their brokerage firms.

41. The trading floor, or trading pit, comprised the main venue for trading NYMEX futures and options on futures prior to the introduction of the Globex electronic market. Individuals who trade for their own account (also known as "locals") and brokers representing client trading interests interact in person on the trading floor. Most trading in NYMEX futures contracts migrated from the trading floor to Globex after electronic trading was introduced, and NYMEX discontinued floor trading of futures contracts during 2015. However, the NYMEX trading floor continues to be an important venue for the trading of futures options and spread options on NYMEX futures contracts.

42. ClearPort provides clearing services for trades in NYMEX products that are negotiated in the "Over-the-Counter" or "OTC" market, sometimes also referred to as "upstairs" market. OTC trades are negotiated off formal exchanges and are often facilitated by brokerage firms. Brokers can directly enter the trades they facilitate in NYMEX products into the ClearPort system for clearing. Alternatively, one party to a negotiated trade can relay trade information to ClearPort, which processes the trade after confirming the terms with the other party to the trade. The clearing services provided by ClearPort can reduce counterparty default risk, as CME clearing serves as the counterparty to every cleared transaction. The NYMEX

charges a per-contract fee for each cleared transaction, and therefore has an economic interest in the volume of trades in its contracts cleared through ClearPort.¹⁵

43. The CME reports trading volumes for each energy futures contract and each option contract on its web site on a daily basis. Volume is reported separately for Globex electronic trading, floor trading, and ClearPort-facilitated OTC trading. For futures contracts volumes are reported by delivery month. For options on futures and calendar spread options volumes are reported by delivery month and by strike price.

V. THE INFORMATION DISCLOSURES IN THIS MATTER

44. I was asked by the CFTC to listen to a total of 63 recordings (and to examine associated transcripts) of telephone conversations between Byrnes and Eibschutz, as well as 16 recordings of telephone conversations between Curtin and Eibschutz. The calls, which are listed by date in Exhibits A and B of the CFTC's amended complaint in this matter, occurred between February 21, 2008 and September 17, 2010. In each of the 63 recordings involving Byrnes and Eibschutz, Byrnes reveals information concerning commodity futures or options on commodity futures trades completed on or through NYMEX. In each of the 16 recordings involving Curtin and Eibschutz, Curtin reveals information concerning commodity futures or options on commodity futures trades completed on or through NYMEX. In virtually all cases the information concerned trades completed on the physical trading floor or trades cleared through the NYMEX ClearPort system, rather than trades completed through the Globex electronic market.

¹⁵ For a description of the current ClearPort fee schedule, see <http://www.cmegroup.com/company/clearing-fees.html>. For a broader description of ClearPort, see http://www.cmegroup.com/clearing/files/CME_ClearPort_Brochure.pdf.

45. The large majority of the disclosed trades occurred in options on energy futures, rather than the futures contracts themselves. Table 2 reports average daily trading volume for each month of 2008, 2009, and 2010 for several of these contracts with frequent disclosures.¹⁶

A. DISCLOSURES OF NON-GLOBEX TRADES

46. The disclosure of information regarding trades completed on the trading floor or OTC may be particularly damaging if the traders involved chose to route their orders to these venues rather than the electronic Globex market in order to limit the amount of information that other market participants might infer. Mr. Eibschutz, in a conversation recorded on February 25, 2009 (13CIV1174-CFTC-0018185) refers to a ClearPort trade as an "upstairs" trade. This is ironic since, as noted, traders typically choose to use upstairs markets at least in part to reduce the degree of information disclosed to the market.

47. Several comments in the recorded conversations support the reasoning that traders who used ClearPort or the trading floor, and whose trading information was disclosed in the recordings in this matter, did so at least in part to limit the amount of information that other traders could infer about their trading activity. Upon learning that a particular trader executed a trade on the floor, Eibschutz stated (13CIV1174-CFTC-0018174) "So, he doesn't want his name out there." Upon learning that a particular trader completed a series of small trades, Byrnes (13CIV1174-CFTC-018244) states "Maybe he spread his business around, not letting people know." Similarly, after revealing to Eibschutz that a single trader made several purchases of the same product through different brokers, Byrnes (13CIV1174-CFTC-018246) states "he

¹⁶ The volume data in Tables 2 and 3 is extracted from datasets provided to me by the CFTC, and identified in Appendix B to this report.

was a buyer on the 340s through everybody it seems yesterday.”¹⁷ I understand this to mean that Byrnes was suggesting that the trader spread his order across multiple brokers to minimize the likelihood that the full size of his order would be known to market participants.

48. The extent of the non-public information about completed trades revealed in these calls varied substantially. In the most extreme cases the information divulged included the contract traded, the trade price, the trade size, the firms on both the buy and sell sides of the trade, the individual traders employed by the firms on both the buy and sell sides of the trade, and the brokerage firm(s) involved. In other cases Byrnes or Curtin reveal to Eibschutz some, but not all, of this information.

49. These information revelations were improper. In particular, the revelation of the identities of the parties to individual trades violates market rules and regulations in effect at all financial markets in the world, to the best of my knowledge. In addition, it is substantially likely that these disclosures would be considered important by an economically rational trader in making investment and trading decisions. I will focus on several specific examples of important disclosures in the following paragraphs. The omission of any particular disclosure from the examples in the following paragraphs does not imply that the disclosure was unimportant or immaterial.

¹⁷ In addition, in a call recorded February 13, 2009 (13CIV1174-CFTC-018174), Eibschutz responds to a revelation about First New York trades by asking "First New York does stuff direct"? I believe that in this context "direct" refers to trades negotiated directly between buyer and seller and reported by them to ClearPort, without use of a broker, thereby limiting even further the number of market participants aware of the trade.

B. EXAMPLES OF DISCLOSURES OF ECONOMICALLY LARGE TRADES

FEB. 24 2009, LO TRADING

50. In a telephone call that occurred on February 25, 2009 (13CIV1174-CFTC-0018185) Byrnes reveals to Eibschutz information regarding a series of large trades in the LO (American option on crude oil futures) contract that occurred the prior day. The information revealed included trading firms and brokers for at least 8,050 puts and 8,050 calls, as well as the names of floor brokers involved in an additional 1,000 puts and 1,000 calls. A single firm was identified as the seller of at least 8,050 put options and buyer of at least 8,050 call options.

51. While the LO market is active (with an average of just over 100,000 contracts trading per day in February 2009, as shown on Table 2), these trades were large. Each LO option provides the right to enter one CL (crude oil) futures contract, which itself is an obligation to deliver or take delivery of 1,000 barrels of crude oil. Trades involving 16,100 LO options therefore pertain to 16.1 million barrels of crude oil. The notional value of 16.1 million barrels of crude oil on the trade date was \$643 million.

FEB. 25 2009, LO TRADING

52. In a telephone call that also occurred on February 25, 2009 (13CIV1174-CFTC-0018188), Byrnes revealed to Eibschutz information regarding an additional large series of LO trades. Byrnes identified one firm that traded at least 1,500 put options, a second firm that traded at least 1,200 put options, and a third firm that traded at least 400 put options and 400 call options. Responding to one revelation in particular, Mr. Eibschutz states "That's a f***ing huge f***ing trade." In total Byrnes revealed the trader on at least one side of trades involving 3,500 LO options. As noted, each LO option provides the right to enter one crude oil futures contract,

which itself is an obligation to deliver or take delivery of 1,000 barrels of crude oil. Trades involving 3,500 LO options therefore pertain to 3.5 million barrels of crude oil. The notional value of 3.5 million barrels of crude oil on the trade date was \$149 million.

March 31, 2009 AO Trading

53. In a call that occurred on April 1, 2009 (13CIV1174-CFTC-0018237) and that referred to trading on March 31, 2009, Byrnes revealed to Eibschutz information regarding trades in the AO (average price options on cash-settled crude oil futures) contract. In particular, he revealed the identities of both parties to trades in 1,800 options.¹⁸ Each AO contract provides the right to enter one CS (cash-settled crude oil) futures contract, which itself pertains to 1,000 barrels of crude oil. A trade involving 1,800 AO options therefore pertains to 1.8 million barrels of crude oil. The notional value of 1.8 million barrels of crude oil on the trade date was \$89.4 million.

April 7, 2009 AO TRADING

54. In a call that occurred on April 8, 2009 (13CIV1174-CFTC-0018239) and that referred to trading on April 7, 2009, Byrnes revealed to Eibschutz information regarding trades in the AO (average price options on cash-settled crude oil futures, contract CS) contract. These trades involved 21,600 call option contracts in total, which is large relative to the average daily trading volume of 9,844 AO contracts during April 2009 (Table 2).¹⁹ Byrnes identified the

¹⁸ The revelations included a January to December 2010 strip involving 75 options per month, a January to December 2011 strip involving 25 call options per month, a January to December 2011 strip involving 25 put options per month, and a January to December 2012 strip involving 25 call options per month.

¹⁹ These were so-called butterfly trades that involved selling call options with strike prices of 60 and 90, while buying call options with a strike price of 75. The divulged trades included volume of 450 per month for calls with strike price of 60, volume of 900 per month for calls with strike price of 75, and calls with volume of 450 per month with strike price of 90. The options were traded for each month of calendar year 2010, implying that the total volume for which trade information was revealed was $(450 + 900 + 450) * 12 = 21,600$ contracts.

single firm that took one side of all the transactions, as well as the firms on the other side of the transaction, and the name of the brokerage firm involved. Each AO contract provides the right to enter one CS (cash-settled crude oil) futures contract, which itself pertains to 1,000 barrels of crude oil. A trade involving 21,600 AO options therefore pertains to 21.6 million barrels of crude oil. The notional value of 21.6 million barrels of crude oil on the trade date was \$1.06 billion.

May 20, 2008 LC Trading

55. In a call recorded May 20, 2008 (13CIV1174-CFTC-0006563) that refers to trading on the same date, Byrnes reveals to Eibschutz information on trading in the LC (European option on Crude Oil futures) contract. He reveals the identity of the seller of 1,000 call options. He also reveals the identity of the purchaser of 300 of the call options, and the name of the brokerage firm involved in the sale of at least 300 call options. By comparison, the average daily trading volume in LC contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 8,841 contracts. Since each LC option pertains to a CL futures contract that calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 1,000 options pertained to 1.0 million barrels of crude oil. The notional value of 1.0 million barrels of crude oil on the trade date was \$129.1 million.

March 6, 2009 LO Trading

56. In a call recorded March 9, 2009 (13CIV1174-CFTC-0018197) that refers to trading on March 6, 2009, Byrnes reveals to Eibschutz information on trading in the LO (American option on Crude Oil futures) contract. He reveals the identity of at least one party to trades in 1,000 put options. Since each LO option pertains to a CL futures contract that calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 1,000 options pertained to

1.0 million barrels of crude oil. The notional value of 1.0 million barrels of crude oil on the trade date was \$45.5 million.

November 17, 2008 LO Trading

57. In a call recorded November 17, 2008 (13CIV1174-CFTC-0006585) Byrnes reveals to Eibschutz information on trading in the LO (American option on Crude Oil futures) contract. He reveals the identity of both trading firms and the brokerage firm for 450 put options. Since each LO option pertains to a CL futures contract that calls for delivery of 1,000 barrels of oil, the disclosures on this date involving 450 options pertained to 450,000 barrels of crude oil. The notional value of 450,000 barrels of crude oil on the trade date was \$24.7 million.

June 23, 2008 LN Trading

58. In a call a call recorded June 23, 2008 (13CIV1174-CFTC-0006496) Byrnes reveals to Eibschutz information on trading in the LN (European option on Natural Gas futures) contract. He reveals the identity of one party in a trade of 2000 LN call options, which he refers to as involving "pretty good size." Since each LN option pertains to a NG futures contract that calls for delivery of 10,000 million British thermal units (MMbtu) of natural gas, the disclosures on this date involving 2000 options pertained to 20 million MMBtu of natural gas. The notional value of 20 million MMBtu on the trade date was \$264 million.

**C. EXAMPLES OF DISCLOSURES OF TRADES THAT ARE BOTH
ECONOMICALLY LARGE AND THAT OCCURRED IN MARKETS WITH
THIN TRADING**

May 11, 2010 WA Trading

59. In a call recorded May 12, 2010 (13CIV1174-CFTC-0005671) that refers to trading on May 11, 2010, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. In particular, he reveals the buyer, seller,

and brokerage firm for trades involving at least 1,500 call options and 4,500 put options.²⁰

Since each option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date were for trades pertaining to at least 12.0 million barrels of crude oil. The notional value of 12.0 million barrels of crude oil on the trade date was \$916 million.

60. By comparison, total trading activity in WA contracts on this date was 13,550 contracts (Table 3, Panel A) and the average daily trading volume in WA contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 5,415 contracts (Table 2). The disclosures on this date are important not only because of their economic magnitude, but because they concerned a volume of trades larger than the average daily trading volume in the contract.

July 18, 2008 WA Trading

61. In a call recorded July 21, 2008 (13CIV1174-CFTC-0006505) that refers to trading on July 18, 2008, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. The information pertains to a "strip" of calendar spread put options with exercise price of -\$0.50, for each month of calendar year 2009. In particular, he reveals the buyer, seller, and brokerage firm for trades involving at least 15,600 (1,300 per month, for each month of calendar year 2009) put options. A single firm was identified as participating in all of these trades. Byrnes also revealed the identity of a pair of floor traders who participated in "a ton" of additional trades in WA put options. Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date of the traders involved in trading 15,600 put contracts

²⁰ The trades involved a six month strip of 500 puts per month, a three month strip of 500 puts per month, and a three month strip of 500 calls per month.

pertained to 31.2 million barrels of crude oil. The notional value of 31.2 million barrels of crude oil on the trade date was over \$4 billion.

62. By comparison, total trading activity in the WA contract on this date was 19,800 contracts (Table 3, Panel B), the average daily trading volume in WA contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 5,415 contracts (Table 2). The disclosures on this date are important not only because of their economic magnitude, but also because they concerned a volume of trades approximately three times larger than the average daily trading volume in the contract.

November 18, 2008 WA Trading

63. In a call recorded November 19, 2008 (13CIV1174-CFTC-0006589) that refers to trading on November 18, 2008, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. The information pertains to a "strip" of calendar spread call options for each month of calendar year 2010. In particular, he reveals the buyer, seller, and brokerage firm for trades involving at least 9,000 (750 per month, for each month of calendar year 2010) call options. A single pair of firms was identified as participating in all of these trades. Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 9000 call options pertained to 18.0 million barrels of crude oil. The notional value of 18.0 million barrels of crude oil on the trade date was \$979 million.

64. By comparison, total trading activity in the WA contract on this date was 13,265 contracts (Table 3, Panel C), and the average daily trading volume in WA contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 5,415 contracts. The disclosures on this date are important not only because of their economic

magnitude, but also because they concerned a volume of trades nearly twice as large as the average daily trading volume in the contract.

May 12, 2008 WZ Trading

65. In a call recorded May 13, 2008 (13CIV1174-CFTC-0006561) that refers to trading on May 12, 2008, Byrnes reveals to Eibschutz information on trading in the WZ (twelve month calendar spread on crude oil futures) contract. In particular, Byrnes revealed the identity of the firms on each side of trades in 600 WZ puts with a strike price of \$0.50. Since each WZ option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 600 call options pertained to 1.2 million barrels of crude oil. The notional value of 1.2 million barrels of crude oil on the trade date was \$149 million.

66. By comparison, total trading activity in the WZ contract on this date was 1,000 contracts (Table 3, Panel D), and the average daily trading volume in WZ contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was just 199 contracts. The disclosures on this date are important not only because of their economic magnitude, but also because they concerned a volume of trades three times as large as the average daily trading volume in the contract.

May 21, 2008 WA Trading

67. In a telephone call that occurred on May 22, 2008 (13CIV1174-CFTC-0006564) and that referred to trading on May 21, 2008, Byrnes revealed to Eibschutz information regarding trades in the WA (one month calendar spread options on crude oil futures) contract.

The disclosures involve a total of 21,300 WA put options.²¹ For at least 15,300 contracts Byrnes reveals the identity of both the buyer and the seller to the trade. He identifies a specific firm (Vitol) as being involved in the trading of 19,000 contracts. Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 21,300 put options pertained to 42.6 million barrels of crude oil. The notional value of 42.6 million barrels of crude oil on the trade date was \$2.98 billion.

68. By comparison, there were a total of 43,675 WA contracts traded on May 21, 2008 (Table 3, Panel E). Perhaps more relevant, the average daily trading volume in WA during the 2008 to 2010 period was only 5,415 contracts (Table 2). The revelations on this date were important not only because of the large economic magnitude of the trades, but also because Mr. Byrnes revealed trader identities for a volume of trades that was approximately four times the average daily trading volume in the contract.

February 12, 2009 WA Trading

69. In a call recorded February 13, 2009 (13CIV1174-CFTC-0018174) that refers to trading on February 12, 2009, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. In particular, he reveals the identity of at least one party to trades in at least 1,850 put and call contracts. Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 1,850 options pertained to 3.7 million barrels of crude oil. The notional value of 3.7 million barrels of crude oil on the trade date was \$126 million.

²¹ The trades involved a 12 month strip of 1,000 puts per month for calendar year 2011, a 12 month strip of 500 puts per month for calendar year 2010, a five month strip (July to November, 2008) of 100 puts per month, a six month strip (July to December 2008) of 200 puts per month, and 1600 July 2008 puts.

70. By comparison, total trading in WA contracts on this date was 3,402 contracts (Table 3, Panel F), and the average daily trading volume in WA contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 5,415 contracts. The disclosures on this date are important not only because of their economic magnitude, but also because they concerned a volume of trades approximately a third as large as the average daily trading volume in the contract.

September 15, 2010 WA Trading

71. In a call recorded September 17, 2010 (13CIV1174-CFTC-0018258) that refers to trading on September 15, 2010, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. In particular, he reveals the identity of both parties to a trade in 6,000 put options (comprising a calendar strip of 500 puts per month for calendar year 2012). Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 6,000 options pertained to 12.0 million barrels of crude oil. The notional value of 12.0 million barrels of crude oil on the trade date was \$912 million.

72. In addition, Byrnes reveals the identities of traders involved in what is implied to be a very large quantity of WA options with expiration dates during calendar year 2011, leading Eibschutz to respond "that's an insane amount of brokerage, dude." Total WA trading on this date was 41,925 contracts (Table 3, Panel G), far in excess of the average daily volume during 2008 to 2010, which was 5415 contracts (Table 2). The disclosures on this date are important not only because of their economic magnitude, but also because they concerned a volume of trades greater than the average daily trading volume in the contract

March 6, 2009 WA Trading

73. In a call recorded March 9, 2009 (13CIV1174-CFTC-0018197) that refers to trading on March 6, 2009, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. In particular, he reveals the identity of both parties to a pair of trades involving a total of 1000 calendar spread options. Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving 1,000 options pertained to 2.0 million barrels of crude oil. The notional value of 2.0 million barrels of crude oil on the trade date was \$91.0 million.

74. By comparison, total trading in WA contracts on this date was 1,460 (Table 3, Panel H) contracts, and the average daily trading volume in WA contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 5,415 contracts. The disclosures on this date are important not only because of their economic magnitude, but also because they concerned a volume of trades approximately a fifth as large as the average daily trading volume in the contract.

February 19, 2009 WA Trading

75. In a call recorded February 20, 2009 (13CIV1174-CFTC-0018177) that refers to trading on February 19, 2009, Byrnes reveals to Eibschutz information on trading in the WA (one month calendar spread on crude oil futures) contract. In particular, Eibschutz inquires about a trade involving 1,000 calendar spread put options, and Byrnes in response reveals the identity of one party to the trade. Since each WA option involves two CL futures contracts, and each CL contract calls for deliveries of 1,000 barrels of oil, the disclosures on this date involving

1,000 options pertained to 2.0 million barrels of crude oil. The notional value of 2.0 million barrels of crude oil on the trade date was \$79 million.

76. By comparison, total trading in WA contracts on this date was 4,675 contracts (Table 3, Panel I) and the average daily trading volume in WA contracts (both calls and puts, for all strike prices and delivery months) during the 2008 to 2010 period was 5,415 contracts. The disclosures on this date are important not only because of their economic magnitude, but also because they concerned a single trade approximately a fifth as large as the average daily trading volume in the contract.

77. In addition to the examples discussed in the preceding paragraphs, there were at least five disclosures that revealed that a single party participated in trades involving at least 500 contracts. These included one disclosure in the LC contract (13CIV1174-CFTC-0006518), one disclosure in the ZA contract (13CIV1174-CFTC-0018242), and three disclosures in the WA contract (13CIV1174-CFTC-0006588, 13CIV1174-CFTC-0018240, 13CIV1174-CFTC-0018199.) There is a substantial likelihood that these disclosures would be important to an economically rational trader in making trading decisions, because of the relatively large trades involved.

D. EXAMPLES OF DISCLOSURES OF TRADES IN THINLY TRADED CONTRACTS

APRIL 21, 2009 ZA TRADING

78. In a telephone call that occurred on April 22, 2009 (13CIV1174-CFTC-0018242) and that referred to trading on April 21, 2009, Byrnes revealed to Eibschutz information regarding trades in the ZA (one month calendar spread options on gasoline futures) contract. In particular, Byrnes revealed the identity of both the buyer and the seller for 500 put options. The revealed trades comprised 100% of the 500 contracts traded the ZA contract on this date

(Table 3, Panel J). By comparison, the average daily trading volume in the ZA contract for both puts and calls (Table 2) from January 2008 to December 2010 was only 83.5 contracts. This revelation was important because it involved trades for more than five times the average daily volume in the contract.

February 23, 2009 KD Trading

79. In a call recorded on February 24, 2009 (13CIV1174-CFTC-0018184) that refers to trading on February 23, 2009, Byrnes reveals to Eibschutz information regarding trades in the KD (One-day option on Natural Gas futures) contract. He reveals the buying as well as the selling firm on a total of 550 KD contracts. In addition, he reveals that a single firm is involved in 350 KD contracts traded. By comparison, total trading activity (including both puts and calls, and all delivery dates) in the KD contract on February 23, 2009 was only 675 contracts (Table 3, Panel K), and average daily trading volume in KD contracts during February 2009 (Table 2) was just 605 contracts. This revelation was important because it involved trades almost as large as the average daily volume in the contract.

March 9, 2009 CD Trading

80. In a call recorded on March 10, 2009 (13CIV1174-CFTC-0018235) that refers to trading on March 9, 2009, Curtin reveals to Eibschutz information regarding trades in the CD (One-day option on Crude Oil futures) contract. He reveals that Centaurus is on the sell side of 300 CD contracts, and also reveals the identity of the buyer on 100 of the CD contracts. By comparison, total trading activity in the CD contract on March 9, 2009 was only 1,200 contracts (Table 3, Panel L), and average daily trading volume in CD contracts during March 2009 (Table 2) was just 526 contracts. This revelation was important because it involved trades for more half the average daily volume in the contract.

81. In addition to the examples discussed in the preceding paragraphs, there were at least nine disclosures that revealed that a single party participated in trades involving at least 200 contracts in markets with very thin trading. This included four disclosures in the CD contract (13CIV1174-CFTC-0006469, 13CIV1174-CFTC-0006501, 13CIV1174-CFTC-0005679 and 13CIV1174-CFTC-0018157) where a 200 contract trade is more than forty percent of the average trading volume of 472 contracts per day, and five disclosures in the WZ contract (13CIV1174-CFTC-0018251, 13CIV1174-CFTC-0006491, 13CIV1174-CFTC-0006504, 13CIV1174-CFTC-0005670, and 13CIV1174-CFTC-0006522) where a 200 contract trade exceeds the average trading volume of 199 contracts per day. Further, there were three disclosures that revealed the identity of parties involved in trades of more than 100 but less than 200 contracts. These included one disclosure in the ZA contract (13CIV1174-CFTC-0018242) where a 100 contract trade is more than the average trading volume of 84 contracts and two disclosures in the KD contract (13CIV1174-CFTC-006593 and 13CIV1174-CFTC-0018178) where a 100 contract trade is more than ten percent of the average trading volume of 919 contracts per day (Daily trading volume figures are from Table 2.)

82. As noted, the importance of a particular disclosure of trader identities depends in part on the size of the trades involved, and also in part on the liquidity and trading activity of the market involved. Each example in this section involves the disclosure of trader identities for trades that were large relative to typical daily trading volumes in the contract involved. It is substantially likely that these disclosures would be important to an economically rational trader in making their trading decisions because the trades were large relative to the liquidity of the

contracts involved, implying that the disclosures could have been large enough to render predatory strategies profitable.²²

E. EXAMPLES OF DISCLOSURES OF TRADING STRATEGIES AND FINANCIAL INFORMATION

83. In addition to disclosing information regarding specific trades completed on the NYMEX floor or through ClearPort, Byrnes disclosed to Eibschutz broader information on the types of trades that particular firms or individuals tended to engage in. As noted, one of the key concerns regarding the inappropriate disclosure of trade information is the possibility that unauthorized parties will learn or will be able to infer the trading strategies used by particular firms.

84. The recorded calls include numerous instances where Eibschutz himself appears to discover new information that he did not previously have about a given firm's trading strategies. In a call recorded on February 22, 2008 (13CIV1174-CFTC-0006468) Eibschutz responds "Oh, DRW does this?" upon being informed by Byrnes that DRW traded a "strip" (several consecutive delivery months) of calendar spread options. In a call recorded October 2, 2008, (13CIV1174-CFTC-0006571), Eibschutz learns that a particular party is active in crude oil trading, stating "I didn't even know those guys did crude." Similarly, in a call recorded on January 26, 2009 (13CIV1174-CFTC-018264) Eibschutz reacts to a revelation by Curtin "Do they do crude, Kinder?"

²² In addition, on three occasions Byrnes or Curtin made disclosures that involved trades in 300 or more WA contracts (13CIV1174-CFTC-0018166, 13CIV1174-CFTC-0018246, and 13CIV1174-CFTC-0005670). On five occasions Byrnes or Curtin made disclosures that involved trades in more than 200 and less than 300 WA contracts (13CIV1174-CFTC-0006503, 13CIV1174-CFTC-0018196, 13CIV1174-CFTC-0018178, 13CIV1174-CFTC-0006598 and 13CIV1174-CFTC-0005679). By comparison, WA trading averaged 5,415 contracts per day during 2008 to 2010 (Table 2). That is, a 200 contract WA trade comprised almost four percent of average daily volume. Trades of this magnitude in illiquid markets could provide sufficient information to affect rational trading decisions if known to other traders.

85. In a call recorded September 10, 2008, (13CIV1174-CFTC-0006511) Eibschutz inquires "Do they do anything else besides CSOs?" and "What do they do?" On the same call, Byrnes states "they are hedging stuff that they probably are holding direct." The revelation that a particular trade is a hedge is important because it allows for inferences regarding the trader's cash market holdings.

86. In addition, multiple calls revealed that certain traders engaged in specific option portfolio strategies. On at least three occasions (13CIV1174-CFTC-0006504, recorded July 18, 2008, 13CIV1174-CFTC-0006571, recorded October 2, 2008, and 13CIV1174-CFTC-0018250, recorded May 20, 2009) Byrnes reveals to or confirms for Eibschutz that certain traders engaged in a straddle strategy. On at least one occasion (13CIV1174-CFTC-0018239, recorded April 8, 2009) Byrnes identifies for Eibschutz four separate firms engaged in a butterfly strategy.

87. In addition, Eibschutz inquired regarding trades that comprised a "fence" strategy on three occasions (13CIV1174-CFTC-0005671, 13CIV1174-CFTC-0018188, and 13CIV1174-CFTC-0018235) and regarding trades that comprised a "straddle" strategy on one occasion (13CIV1174-CFTC-0005673). Byrnes responded by revealing party identities in each case. Further, on at least one occasion (13CIV1174-CFTC-0018169) Byrnes reveals to Eibschutz the identities of traders who entered call spreads (the sale of one call coupled with the purchase of another call with a different exercise price) in the AO (European option on the CS crude oil futures) contract.

88. Revelation or confirmation that certain traders engage in specific option strategies is important because it may allow others to make inferences regarding the traders' views regarding likely future market movements or regarding other positions the traders might hold.

89. In addition, on at least one occasion (13CIV1174-CFTC-0006467, recorded February 21, 2008) Byrnes responded to detailed queries from Eibschutz regarding an individual firm's trading strategies in the LN (European option on Natural Gas futures) contract. More specifically, Eibschutz inquires "Like what kind of LNs are they doing? Like how far out?" Byrnes responds with descriptions of specific trades executed by the firm, and also volunteers that "They do a lot of location stuff too." An economically rational trader could use these revelations in making trading decisions, because they reveal specific elements of a firm's trading strategies.

90. Finally, on at least one occasion, Byrnes reveals to Eibschutz information relevant to assessing firms' financial condition. In particular, in a call recorded on September 12, 2008 (13CIV1174-CFTC-0006513), Byrnes reveals the names of two financial institutions who are each interested in the novation of "a couple of hundred" trades involving Lehman Brothers. This revelation was important since Lehman Brothers was on the brink of bankruptcy, and firms that had entered large numbers of bilateral trading contracts with Lehman were potentially exposed to substantial losses in the event of Lehman's default.

F. DISCLOSURES OVER MULTIPLE TRADING DAYS

91. Disclosures pertaining to the same firms across multiple trading days within a relatively short period of time occurred frequently, as illustrated by the following examples.

92. Byrnes disclosed to Eibschutz information regarding Nexen's trading in the WA contract on May 4, 19, and 20, 2009 (13CIV1174-CFTC-0018246, 13CIV1174-CFTC-0018250, and 13CIV1174-CFTC-0018252).

93. Byrnes disclosed information to Eibschutz regarding Vitol's trading in the WA contract on February 23 and 26, as well as March 6, 2009 (13CIV1174-CFTC-0018184,

13CIV1174-CFTC-0018189, and 13CIV1174-CFTC-0018197). Curtin disclosed information to Eibschutz regarding Vitol's trading in the WA contract on March 2, 9, and 13, 2009 (13CIV1174-CFTC-0018194, 13CIV1174-CFTC-0018235, and 13CIV1174-CFTC-0018236).

94. Byrnes disclosed information to Eibschutz regarding Prime's trading in the WA contract on May 11 and 21, 2010 (13CIV1174-CFTC-0005671 and 13CIV1174-CFTC-0005672).

95. Byrnes disclosed information to Eibschutz regarding Mako's trading in the LO contract on October 2 and 13, 2008 (13CIV1174-CFTC-0006571 and 13CIV1174-CFTC-0006579).

96. Byrnes disclosed information to Eibschutz regarding Centaurus' trading on February 24, 2009 (13CIV1174-CFTC-0018184) and February 25, 2009 (13CIV1174-CFTC-0018188).

97. Byrnes disclosed information to Eibschutz regarding Kramer's trading in the WA contract on February 13 and 18, as well as April 1 and 7, 2009 (13CIV1174-CFTC-0018174, 13CIV1174-CFTC-0018176, 13CIV1174-CFTC-0018227, and 13CIV1174-CFTC-0018239).

98. Byrnes disclosed information to Eibschutz regarding Plains' trading in the WA contract on May 6 and 14, 2009 (13CIV1174-CFTC-0018200, 13CIV1174-CFTC-0018249).

99. Byrnes disclosed information to Eibschutz regarding CDMI's trading in the WA contract on May 17 and May 24, 2010 (13CIV1174-CFTC-0005670 and 13CIV1174-CFTC-0005673).

100. The disclosure of even a single trade is potentially important, in part because it may allow others to infer aspects of a given trader's trading strategy. The disclosure of a given trader's transactions across multiple days is more important, because it provides additional

information that can be used to infer the trader's strategies, and/or to confirm conjectures regarding the traders' strategies.

G. DISCLOSURES REGARDING SKILLED TRADERS

101. As noted, one reason that disclosure of trading information is problematic is that other traders may seek to infer aspects of a given trader's strategies. This danger will be more acute, and the information release more important, if the trader involved is viewed as being particularly skilled.

102. A number of the disclosures in this matter concerned trades made by Mr. John Arnold and/or his hedge fund, Centaurus Advisors. Mr. Arnold was (before his retirement) viewed by many as a skilled trader. For example, Forbes Magazine referred to him as "A hedge fund billionaire known as the 'king of natural gas'".²³ In addition to the occurrences identified in Section V.E above, disclosures regarding Centaurus' trading occurred on at least June 25, 2008 (13CIV1174-CFTC-0006497), October 7, 2008 (13CIV1174-CFTC-0006576), October 10, 2008 (13CIV1174-CFTC-0006577), March 10, 2009 (13CIV1174-CFTC-0018235), and May 5, 2009 (13CIV1174-CFTC-0018246). These disclosures are important because they concerned the activities of a hedge fund with a manager broadly acknowledged to be skilled.

103. In addition to the six occurrences identified in Section V.E above, at least twenty three additional disclosures in this matter were with regards to trades entered by the Vitol Group.²⁴ Vitol is a successful firm that is viewed as employing skilled traders. For example,

²³ <http://www.forbes.com/sites/nathanvardi/2012/05/02/the-king-of-natural-gas-quits/#212dcd9d51c3>.

²⁴ Information regarding Vitol trades is revealed in transcripts of recorded calls with the following Bates numbers: 13CIV1174-CFTC-0006564, 13CIV1174-CFTC-0006569, 13CIV1174-CFTC-0006504, 13CIV1174-CFTC-0006505, 13CIV1174-CFTC-0006512, 13CIV1174-CFTC-0006588, 13CIV1174-CFTC-0006589, 13CIV1174-CFTC-0006465, 13CIV1174-CFTC-0006598, 13CIV1174-CFTC-0018157, 13CIV1174-CFTC-0018174, 13CIV1174-CFTC-0018185, 13CIV1174-CFTC-0018239, 13CIV1174-CFTC-0018199, 13CIV1174-CFTC-0018244, 13CIV1174-CFTC-0018243, 13CIV1174-CFTC-0018200, 13CIV1174-CFTC-0018250, 13CIV1174-

The Telegraph reports that Vitol employs an "army of razor sharp young traders."²⁵ Vitol regularly engages in contracts involving the shipping and physical delivery of energy commodities, implying that its traders may be relatively well-informed regarding supply and demand fundamentals. The combination of a reputation for employing skilled traders, the possibility that the traders are well informed regarding fundamentals, and the large number of information disclosures imply that the revelations regarding Vitol's trades are likely to be important to other's trading decisions.

VI. SUMMARY OF OPINIONS

104. I summarize my opinions as follows:

- (i) Market transparency refers to the degree to which financial markets disseminate information on potential or completed trades to those not directly involved in the transactions. While transparency varies across financial markets and over time, to my knowledge every financial market in the world prohibits the disclosure of the identities of the principals involved in trades.
- (ii) Revelation of trader identities is potentially damaging because it may allow others to forecast traders' short term trading intentions and/or allow others to infer and mimic traders' longer term trading strategies.
- (iii) The recorded telephone conversations supplied to me revealed a consistent pattern by which Mr. Byrnes and Mr. Curtin made disclosures to Mr.

CFTC-0018252, 13CIV1174-CFTC-0006562, 13CIV1174-CFTC-006567, 13CIV1174-CFTC-0006577, 13CIV1174-CFTC-0006594, 13CIV1174-CFTC-0018179.

²⁵ <http://www.telegraph.co.uk/finance/12047634/EXCLUSIVE-Inside-the-commodity-trader-Vitol-that-pulls-the-levers-of-the-global-economy.html>.

Eibschutz regarding commodity futures or options on commodity futures traded on or through the NYMEX that were clearly improper, and that would violate the rules and regulations governing trading on any financial market in the world.

- (iv) As explained above, it is substantially likely that the information improperly revealed by Mr. Byrnes and Mr. Curtin to Mr. Eibschutz would be important to an economically rational trader in formulating his or her trading decisions. In some cases the revelations were important because the trades for which confidential information was revealed were economically large. In some cases the revelations were important because the trades for which confidential information was revealed were large relative to typical trading activity in the contract involved, implying that “predatory” trading strategies could be profitable. In some cases the revelations were important because they provided direct evidence that traders followed certain portfolio strategies. In other cases the revelations were important because they revealed elements of strategies used by traders broadly viewed as skilled, or because they provided insights into trading strategies used across multiple days.


Hendrik Bessembinder


Date

Appendix A:

Depositions and Testimony provided by Hendrik Bessembinder

I. Depositions Given:

- United States Commodity Futures Trading Commission, plaintiff, v. Eric Moncada, BES Capital LLC and Serdika, LLC, defendants, (12-cv-8791), United States District Court for the Southern District of New York. Deposition Date: December 3, 2013.
- Morton L. Topfer, et al., plaintiffs, v. Quellos Custom Strategies LLC, et al., Defendants, Cause No. D-1-GN-08-003638, in the District Court, Travis County, Texas. Deposition Date: September 29, 2010.
- In Re. Initial Public Offerings Securities Litigation, Master File No. 21 MC 92 (SAS), United States District Court, Southern District of New York. Deposition Date: March 20, 2008.
- Tom Gonzales, as Personal Representative of the Estate of Thomas J. Gonzales II, Plaintiffs, v. Franchise Tax Board, an Agency of the State of California, Defendant, in the Superior Court of the County of San Francisco, California, No. CGC-06-454297. Deposition Date: January 21, 2008.
- United States Commodity Futures Trading Commission, plaintiff, vs. Jeffrey A. Bradley and Robert L. Martin, defendants, Case No. 05-CV-62-JHP-FHM, Northern District of Oklahoma. Deposition Date: May 24, 2006.
- Official Employment-Related Issues Committee of Enron Corp., et al., plaintiff, vs. John Arnold, et al., defendants, Case No. 01-16034-AJG, Southern District of New York, Adversary No. 03-3522. Deposition Date: June 17, 2005.
- Internet Law Library, Inc., et al. Plaintiffs, vs. Southridge Capital Management LLC, et al., Southern District of New York, (01-CV-6600). Deposition Date: June 23, 2003.

Testimony Provided:

- United States v. Michael Coscia, Case No. 14-CR-00551, United States District Court, Northern District of Illinois. Testimony Date: November 2, 2015.
- BCP Trading and Investments, LLC v. Commissioner of Internal Revenue, United States Tax Court, Docket No. 10200-08 and 10201-08. Testimony Date: August 28, 2013.
- David B. Greenberg, et al., Petitioner, v. Commissioner of Internal Revenue, Respondent, United States Tax Court, Docket No. 1143-05 etc. Testimony Date: February 14, 2011.
- Palm Canyon X Investments, LLC, AH Investments Holdings, Inc., Tax Matters Partner, Petitioner, v. Commissioner of Internal Revenue, Respondent, United States Tax Court, Docket No. 5610-06. Testimony Date: August 16, 2007.
- Official Employment-Related Issues Committee of Enron Corp., et al., plaintiff, vs. John Arnold, et al., defendants, Case No. 01-16034-AJG, Southern District of New York, Adversary No. 03-3522. Testimony Date: August 15, 2005.
- United States of America before the Commodity Futures Trading Commission, in the Matter of Anthony J. DiPlacido, respondent, CFTC Docket No. 01-23. Testimony Date: December 3, 2003.

Appendix B: Materials Considered

Manuscripts:

H. Bessembinder, W. Maxwell, and K. Venkataraman, “Market transparency, liquidity externalities, and institutional trading costs in corporate bonds, *Journal of Financial Economics*, 82, 2006, 251-288.

S. Baruch, “Who benefits from an open limit-order book?” *Journal of Business*, 78, 2005, 1267-1306.

C. Comerton-Forde and K.M. Tang, “Anonymity, liquidity, and fragmentation”, *Journal of Financial Markets*, 12, 337-367.

M. K. Brunnermeier and L. H. Pedersen, “Predatory Trading”, 2005, *Journal of Finance*, 60, 1825-1863,

H. Bessembinder, A. Carrion, L. Tuttle, and K. Venkataraman, “Liquidity, Resiliency, and Market Quality around Predictable Trades: Theory and Evidence,” 2016, *Journal of Financial Economics*, forthcoming.

S. Buti, B. Rindi, and I. Werner, “Dark pool trading strategies, market quality, and welfare”, 2016, *Journal of Financial Economics*, forthcoming.

H. Bessembinder and K. Venkataraman, “Does an electronic stock exchange need an upstairs market?” *Journal of Financial Economics*, 2004, 73, 3-36

Descriptive documents provided by CFTC:

- AB -brent-crude-oil 2 month spread option.pdf
- AO-west-texas-int.pdf
- brent-crude-oi 2 month spread option.pdf
- CD - daily crude options.light-sweet-cr.pdf
- CL -light-sweet-crude future contract.pdf
- KD.henry hub natural-gas option.pdf
- LL.pdf
- LN-natural-gas_options.pdf
- LO-light-sweet-crude.pdf
- LT- Gulfcoast ULSD up-down futures.pdf

- NN.henry-hub-natgaslastday.pdf
- RB.rbob-gas.pdf
- WA- WA Calendar Spread Option- light-sweet-cr.pdf
- WZ.wti calendar spread.cme.pdf
- ZA.rbob-gasoline option.cme.pdf
- Datum on NYMEX NG futures settlement price on June 23, 2008.

Data on NYMEX CL futures prices, from the U.S. Energy Information Administration, downloaded from http://www.eia.gov/dnav/pet/pet_pri_fut_s1_d.htm.

Excel files provided by CFTC

- 2016-01-14 - Call Summary For Expert.xlsx
- 2016.1.20 Daily Volume Charts.xlsx
- CRUDE OIL CAL SPREAD OPTIONS 2008 - 2010.xlsx
- CRUDE OIL DAILY OPTIONS 2008 - 2010.xlsx
- EUR STYLE CRUDE OIL OPTIONS 2008 - 2010.xlsx
- EUR STYLE CRUDE OIL OPTIONS 2008 - Q2 2009.xlsx
- EUR STYLE CRUDE OIL OPTIONS Q3 2009 - 2010.xlsx
- EUR STYLE NATURAL GAS OPTIONS Jan 2009 - Apr 2009.xlsx
- EUR STYLE NATURAL GAS OPTIONS Jan 2010 - Apr 2010.xlsx
- EUR STYLE NATURAL GAS OPTIONS May 2010 - Aug 2010.xlsx
- EUR STYLE NATURAL GAS OPTIONS May2009 - Aug 2009.xlsx
- EUR STYLE NATURAL GAS OPTIONS Q1 2008 - Q2 2008.xlsx
- EUR STYLE NATURAL GAS OPTIONS Q3 2008 - Q4 2008.xlsx
- EUR STYLE NATURAL GAS OPTIONS Sep 2009 - Dec 2009.xlsx
- EUR STYLE NATURAL GAS OPTIONS Sep 2010 - Dec 2010.xlsx
- NATURAL GAS DAILY OPTIONS 2008 - 2010.xlsx

- PF LO CS and WS 2008 - 2010.xlsx
- RBOB CAL SPREAD OPTION 2008 - 2010.xlsx
- CFTC Commodity Codes .pdf
- Option Class.pdf
- AO Q1 Q2 2009.xlsx
- AO Q1 Q2 2010.xlsx
- AO Q3 Q4 2008.xlsx
- AO Q3 Q4 2009.xlsx
- AO Q3 Q4 2010.xlsx
- LO 2008.xlsx
- LO 2009.xlsx
- LO 2010.xlsx
- NATURAL GAS DAILY OPTIONS 2008 - 2010.xlsx
- PF LO CS and WS 2008 - 2010.xlsx
- RBOB CAL SPREAD OPTION 2008 - 2010.xlsx
- LL market data 2008 - 2010.xlsx
- List of CFTC Contract Market Codes 2.10.16.docx

Transcripts of Audio Recordings provided by CFTC

Number	Date	Bates Number (CME NYMEX)	Bates Number (CFTC)
Byrnes Disclosures in Exhibit A to Amended Complaint			
1	2/21/2008	CME-CFTC-SUP-11665	13CIV1174-CFTC-0006467
2	2/22/2008	CME-CFTC-SUP-11667	13CIV1174-CFTC-0006469
3	2/22/2008	CME-CFTC-SUP-11666	13CIV1174-CFTC-0006468
4	5/13/2008	CME-CFTC-SUP-11868	13CIV1174-CFTC-0006561
5	5/20/2008	CME-CFTC-SUP-11870	13CIV1174-CFTC-0006563
6	5/22/2008	CME-CFTC-SUP-11871	13CIV1174-CFTC-0006564
7	5/30/2008	CME-CFTC-SUP-11876	13CIV1174-CFTC-0006569
8	6/17/2008	CME-CFTC-SUP-11799	13CIV1174-CFTC-0006491
9	6/23/2008	CME-CFTC-SUP-11802	13CIV1174-CFTC-0006494
10	6/23/2008	CME-CFTC-SUP-11804	13CIV1174-CFTC-0006496
11	6/25/2008	CME-CFTC-SUP-11805	13CIV1174-CFTC-0006497
12	6/25/2008	CME-CFTC-SUP-11806	13CIV1174-CFTC-0006498
13	7/2/2008	CME-CFTC-SUP-11809	13CIV1174-CFTC-0006501
14	7/3/2008	CME-CFTC-SUP-11810	13CIV1174-CFTC-0006502
15	7/14/2008	CME-CFTC-SUP-11811	13CIV1174-CFTC-0006503
16	7/18/2008	CME-CFTC-SUP-11812	13CIV1174-CFTC-0006504
17	7/21/2008	CME-CFTC-SUP-11813	13CIV1174-CFTC-0006505
18	9/10/2008	CME-CFTC-SUP-11819	13CIV1174-CFTC-0006511
19	9/11/2008	CME-CFTC-SUP-11820	13CIV1174-CFTC-0006512
20	9/12/2008	CME-CFTC-SUP-11821	13CIV1174-CFTC-0006513
21	9/25/2008	CME-CFTC-SUP-11826	13CIV1174-CFTC-0006518
22	10/2/2008	CME-CFTC-SUP-11878	13CIV1174-CFTC-0006571
23	10/8/2008	CME-CFTC-SUP-11883	13CIV1174-CFTC-0006576
24	10/13/2008	CME-CFTC-SUP-11886	13CIV1174-CFTC-0006579
25	11/17/2008	CME-CFTC-SUP-11892	13CIV1174-CFTC-0006585
26	11/18/2008	CME-CFTC-SUP-11895	13CIV1174-CFTC-0006588
27	11/19/2008	CME-CFTC-SUP-11896	13CIV1174-CFTC-0006589
28	11/25/2008	CME-CFTC-SUP-11663	13CIV1174-CFTC-0006465
29	11/25/2008	CME-CFTC-SUP-11900	13CIV1174-CFTC-0006593
30	12/4/2008	CME-CFTC-SUP-11905	13CIV1174-CFTC-0006598
31	1/20/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018196
32	1/29/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018157
33	2/4/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018166
34	2/11/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018178
35	2/13/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018174
36	2/18/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018176
37	2/20/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018177
38	2/24/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018184
39	2/25/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018185

Number	Date	Bates Number (CME NYMEX)	Bates Number (CFTC)
40	2/25/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018188
41	2/27/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018189
42	3/9/2009	NX-CFTC-WB-0340	13CIV1174-CFTC-0018197
43	4/1/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018237
44	4/1/2009	NX-CFTC-WB-0340	13CIV1174-CFTC-0018227
45	4/8/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018239
46	4/13/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018240
47	4/21/2009	NX-CFTC-WB-0340	13CIV1174-CFTC-0018199
48	4/22/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018242
49	4/30/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018244
50	4/30/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018243
51	5/5/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018246
52	5/7/2009	NX-CFTC-WB-0340	13CIV1174-CFTC-0018200
53	5/15/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018249
54	5/20/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018250
55	5/20/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018251
56	5/21/2009	NX-CFTC-WB-0338	13CIV1174-CFTC-0018252
57	5/11/2010	BYRN-POTEN-0000079	13CIV1174-CFTC-0005669
58	5/12/2010	BYRN-POTEN-0000081	13CIV1174-CFTC-0005671
59	5/18/2010	BYRN-POTEN-0000083	13CIV1174-CFTC-0005673
60	5/24/2010	BYRN-POTEN-0000082	13CIV1174-CFTC-0005672
61	5/25/2010	BYRN-POTEN-0000080	13CIV1174-CFTC-0005670
62	6/9/2010	BYRN-POTEN-0000089	13CIV1174-CFTC-0005679
63	9/17/2010	NX-CFTC-WB-0338	13CIV1174-CFTC-0018258
Curtin Disclosures in Exhibit B to Amended Complaint			
1	5/14/2008	CME-CFTC-SUP-11869	13CIV1174-CFTC-0006562
2	5/29/2008	CME-CFTC-SUP-11874	13CIV1174-CFTC-0006567
3	6/10/2008	CME-CFTC-SUP-11830	13CIV1174-CFTC-0006522
4	6/23/2008	CME-CFTC-SUP-11836	13CIV1174-CFTC-0006528
5	6/24/2008	CME-CFTC-SUP-11837	13CIV1174-CFTC-0006529
6	10/10/2008	CME-CFTC-SUP-11884	13CIV1174-CFTC-0006577
7	10/13/2008	CME-CFTC-SUP-11885	13CIV1174-CFTC-0006578
8	11/25/2008	CME-CFTC-SUP-11901	13CIV1174-CFTC-0006594
9	1/16/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018233
10	1/26/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018264
11	2/5/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018169
12	2/23/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018179
13	3/3/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018194
14	3/9/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018234
15	3/10/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018235
16	3/16/2009	NX-CFTC-WB-0339	13CIV1174-CFTC-0018236

Appendix C: Publications by Hendrik Bessembinder

Journal Articles

“Liquidity, Resiliency, and Market Quality around Predictable Trades: Theory and Evidence” (with Al Carrion, Laura Tuttle, and Kumar Venkataraman), Journal of Financial Economics, forthcoming.

“Market Making Contracts, Firm Value, and the IPO Decision” (with Jia Hao and Kuncheng Zheng), Journal of Finance, October 2015.

“Predictable Corporate Distributions and Stock Returns” (with Feng Zhang), Review of Financial Studies, April 2015.

“Trading Activity and Transaction Costs in Structured Credit Products” (with William Maxwell and Kumar Venkataraman), Financial Analysts Journal, December 2013.

“Firm Characteristics and Long-run Stock Returns after Corporate Events” (with Feng Zhang), Journal of Financial Economics, July 2013.

“Noisy Prices and Inference Regarding Returns” (with Elena Asparouhova and Ivalina Kalcheva), Journal of Finance, April 2013.

“Liquidity Biases in Asset Pricing Tests” (with Elena Asparouhova and Ivalina Kalcheva), Journal of Financial Economics, May 2010.

“Hidden Liquidity: An Analysis of Order Exposure Strategies in Automated Markets” (with Kumar Venkataraman and Marios Panayides), Journal of Financial Economics, December 2009.

“Measuring Abnormal Bond Performance” (with William Maxwell, Kathleen Kahle, and Danielle Xu), Review of Financial Studies, October 2009.

“Transparency and the Corporate Bond Market” (with William Maxwell), Journal of Economic Perspectives, Spring 2008.

“Market Transparency, Liquidity Externalities, and Institutional Trading Costs in Corporate Bonds” (with William Maxwell and Kumar Venkataraman), Journal of Financial Economics, November 2006.

“Gains From Trade Under Uncertainty: The Case of Electric Power Markets” (with Michael Lemmon), Journal of Business, July 2006.

"Does an Electronic Stock Exchange need an Upstairs Market?" (with Kumar Venkataraman), Journal of Financial Economics, June 2004.

"Quote-Based Competition and Trade Execution Costs in NYSE-Listed Stocks", Journal of Financial Economics, December 2003.

"Trade Execution Costs and Market Quality after Decimalization", Journal of Financial and Quantitative Analysis, December 2003.

"Issues in Assessing Trade Execution Costs", Journal of Financial Markets, June 2003.

"Equilibrium Pricing and Optimal Hedging in Electricity Forward Markets" (with Michael Lemmon), Journal of Finance, June 2002.

"Tick Size, Spreads, and Liquidity: An Analysis of Nasdaq Securities Trading Near Ten Dollars", Journal of Financial Intermediation, 2000, Volume IX, Issue 3.

"Trade Execution Costs on Nasdaq and the NYSE: A Post-Reform Comparison", Journal of Financial and Quantitative Analysis, September 1999.

"Trading Costs and Volatility for Technology Stocks" (with Herb Kaufman), Financial Analysts Journal, September/October 1998.

"Market Efficiency and the Returns to Technical Analysis" (with Kalok Chan), Financial Management, Summer 1998.

"A Cross-Exchange Comparison of Execution Costs and Information Flow for NYSE-listed Stocks" (with Herb Kaufman), Journal of Financial Economics, December 1997.

"A Comparison of Trade Execution Costs for NYSE and Nasdaq-listed Stocks" (with Herb Kaufman), Journal of Financial and Quantitative Analysis, September 1997.

"The Degree of Price Resolution and Equity Trading Costs", Journal of Financial Economics, July 1997.

"An Empirical Examination of Information, Differences of Opinion, and Trading Activity" (with Paul Seguin and Kalok Chan), Journal of Financial Economics, January 1996.

"Is There a Term Structure of Futures Volatilities? Reevaluating the Samuelson Hypothesis" (with Jay Coughenour, Paul Seguin, and Margaret Smoller), Journal of Derivatives, Winter 1996.

"Mean Reversion in Equilibrium Asset Prices: Evidence from the Futures Term Structure" (with Jay Coughenour, Margaret Monroe, and Paul Seguin) Journal of Finance, March 1995.

"The Profitability of Technical Trading Rules in the Asian Stock Markets" (with Kalok Chan),
Pacific-Basin Finance Journal, July 1995.

"Bid-Ask Spreads in the Interbank Foreign Exchange Markets", Journal of Financial Economics, June 1994.

"Return Autocorrelations Around Non-Trading Days", (with Michael Hertzel) Review of Financial Studies, 1993 (Volume 6, number 1).

"An Empirical Analysis of Risk Premia in Futures Markets", Journal of Futures Markets, September 1993.

"Price Volatility, Trading Volume, and Market Depth: Evidence from Futures Markets" (with Paul Seguin) Journal of Financial and Quantitative Analysis, March 1993.

"Futures Trading Activity and Stock Price Volatility", (with Paul Seguin) Journal of Finance, December 1992.

"Systematic Risk, Hedging Pressure, and Risk Premiums in Futures Markets" Review of Financial Studies, 1992 (Volume 5, number 4). (Reprinted in Futures Markets, Edward Elgar Publishing, Inc., 1997.)

"Time Varying Risk Premia and Forecastable Returns in Futures Markets" (with Kalok Chan) Journal of Financial Economics, October 1992.

"Forward Contracts and Firm Value: Investment Incentive and Contracting Effects" Journal of Financial and Quantitative Analysis, December 1991.

BOOK CHAPTERS

"Bid-Ask Spreads: Measuring Trade Execution Costs in Financial Markets" (with Kumar Venkataraman, in Encyclopedia of Quantitative Finance, edited by Rama Cont, John Wiley & Sons, 2010.

"Trading Costs and Return Volatility: Evidence From Exchange Listings" (with Subhrendu Rath), in Market Liquidity, edited by Greg N. Gregoriou and Francois-Serge Lhabitant, John Wiley & Sons, 2008.

"Exchange Rate Exposure and the Hedging of Currency Risk" Recent Developments in International Banking and Finance, Vol. VI, 1991.

OTHER PUBLICATIONS

“Predictable ETF Order Flow and Market Quality,” Journal of Trading, October 2015.

“Estimating Trade Execution Costs from Public Data,” Journal of Financial Transformation (invited paper), April 2005.

"Futures Price Volatility and Spot Price Stationarity" (with Jay Coughenour, Paul Seguin, and Margaret Smoller), Chicago Board of Trade Research Symposium Proceedings, Fall 1996.

Table 1: Contracts for which trades information was revealed by Byrnes and/or Curtin to Eibschutz

Symbol	Product	Approximate Number of Occurrences
AO	Option on the Crude Oil Financial Futures (CS)	7
CD	Option (daily) on Light Sweet Crude Oil Futures (CL)	10
CS	Financially settled average price crude oil future	1
CL	Light Sweet Crude Oil Futures	1
KD	Option (daily) on Henry Hub Natural Gas Futures (NG)	7
LC	European option on Light Sweet Crude Oil Futures (CL)	3
LL	Los Angeles Jet Fuel (OPIS) Futures	1
LN	European Option on Natural Gas (Henry Hub) Physical Futures	2
LO	American Option on Light Sweet Crude Oil Futures (CL)	13
WA	One month calendar spread option on Light Sweet Crude Oil Futures (CL)	43
WS	Crude Oil financial futures contract	1
WZ	Twelve month calendar spread option on Light Sweet Crude Oil Futures (CL)	11
ZA	One month calendar spread option on RBOB Gasoline Futures (RB)	1

Table 2: Average Daily Volume in Selected Contracts

Year	Month	AO	CD	CS	KD	LC	LN	LO	LT	WA	WZ	ZA
2008	1	8,872	653	2,538	89	16,558	116,493	159,270	417	3,709	5	0
2008	2	16,637	549	2,874	171	20,067	167,295	158,980	504	3,337	389	0
2008	3	6,603	392	2,546	236	25,770	162,320	165,223	773	3,891	123	0
2008	4	4,606	871	2,010	256	12,736	132,197	159,760	288	2,914	391	0
2008	5	7,043	701	2,980	399	16,514	114,772	180,612	478	7,025	877	0
2008	6	4,645	600	2,025	699	15,304	125,012	182,896	345	4,862	344	0
2008	7	6,875	339	2,237	676	17,850	142,757	173,609	215	2,982	200	0
2008	8	6,278	372	1,650	378	13,887	126,402	130,168	232	2,742	455	0
2008	9	7,669	615	4,655	436	10,348	124,281	170,794	270	2,989	666	0
2008	10	15,748	484	7,423	588	10,915	126,231	180,294	683	6,272	437	0
2008	11	12,396	498	5,570	755	8,355	101,428	148,738	488	5,307	13	0
2008	12	9,444	371	4,355	636	6,438	96,717	117,285	771	4,806	43	0
2009	1	9,811	239	5,604	1,096	6,932	141,571	101,677	890	2,472	78	0
2009	2	12,592	222	6,073	605	5,963	131,900	100,616	840	2,373	249	0
2009	3	13,432	526	4,870	793	5,868	144,734	106,455	582	3,604	36	0
2009	4	9,844	346	3,051	768	6,060	86,112	101,442	746	3,747	102	952
2009	5	13,299	218	3,737	940	11,909	98,187	117,668	967	3,180	121	35
2009	6	13,998	478	3,894	647	6,382	88,961	125,985	807	2,802	32	246
2009	7	7,979	428	3,712	728	8,314	86,429	138,067	1,015	3,275	52	0
2009	8	16,715	270	3,944	724	5,357	85,343	144,309	802	4,012	138	27
2009	9	13,137	349	3,576	1,298	6,359	117,126	150,457	734	2,714	80	86
2009	10	18,177	545	4,538	990	4,221	99,363	163,230	1,319	1,639	109	164
2009	11	14,000	329	4,142	629	6,096	78,874	143,388	1,258	1,614	58	0
2009	12	11,030	178	3,995	939	3,072	98,772	117,975	1,106	4,389	0	27
2010	1	18,661	321	4,799	989	4,074	109,492	152,026	1,919	6,476	87	24
2010	2	14,726	538	5,235	1,188	3,695	100,132	158,525	2,098	7,505	458	11
2010	3	17,575	461	4,888	1,133	6,109	101,897	176,628	3,024	4,978	185	17
2010	4	30,361	476	5,192	1,560	4,677	95,682	205,872	2,456	9,236	160	291
2010	5	31,027	549	5,978	1,753	5,636	101,092	342,626	2,427	7,387	283	81
2010	6	31,831	527	5,488	1,543	3,476	153,269	220,139	2,647	6,872	131	245
2010	7	18,501	309	4,554	1,042	3,747	111,337	187,976	1,928	7,072	69	19
2010	8	19,257	543	5,959	1,264	3,861	119,192	204,425	1,645	17,182	368	23
2010	9	15,272	543	4,441	1,503	7,808	114,271	190,334	2,187	16,564	98	246
2010	10	16,415	435	5,297	1,416	12,728	117,846	239,854	1,993	10,074	300	95
2010	11	15,262	1,125	5,049	2,372	7,450	131,505	218,174	2,142	6,225	24	281
2010	12	10,875	535	3,590	1,797	4,628	99,616	164,647	1,540	8,215	0	109
All	All	13,895	472	4,231	919	8,841	115,197	164,014	1,182	5,415	199	84

Source: CFTC Trading Volume Data Files

Table 3: Volumes in Selected Contracts on Selected Dates

Delivery			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Year	Strike	Call/Put	Panel A: WA Trading on May 11, 2010												
2010	-1.75	C	0	0	0	0	0	0	75	0	0	0	0	0	75
2010	-1	C	0	0	0	0	0	0	400	0	0	0	0	0	400
2010	-0.65	C	0	0	0	0	0	0	0	0	0	200	0	0	200
2010	0	C	0	0	0	0	0	0	500	500	500	500	500	500	3,000
2010	1	C	0	0	0	0	0	0	250	250	250	250	250	250	1,500
2010	-3	P	0	0	0	0	0	0	250	250	250	250	250	250	1,500
2010	-2	P	0	0	0	0	0	0	1,650	1,300	1,850	500	500	500	6,300
2010	-1.75	P	0	0	0	0	0	0	75	0	0	0	0	0	75
2010	-1	P	0	0	0	0	0	0	0	300	0	0	0	0	300
2010	-0.65	P	0	0	0	0	0	0	0	0	0	200	0	0	200
	Total		0	0	0	0	0	0	3,200	2,600	2,850	1,900	1,500	1,500	13,550
			Panel B: WA Trading on July 18, 2008												
2008	0.75	C	0	0	0	0	0	0	0	0	0	300	300	300	900
2009	-0.5	P	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	18,900
	Total		1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,875	1,875	1,875	19,800
			Panel C: WA Trading on November 18, 2008												
2008	-0.5	C	0	0	0	0	0	0	0	0	0	0	0	100	100
2008	0	C	0	0	0	0	0	0	0	0	0	0	0	100	100
2008	-0.8	P	0	0	0	0	0	0	0	0	0	0	0	100	100
2008	-0.5	P	0	0	0	0	0	0	0	0	0	0	0	100	100
2008	-0.35	P	0	0	0	0	0	0	0	0	0	0	0	300	300
2008	-0.3	P	0	0	0	0	0	0	0	0	0	0	0	300	300
2008	-0.1	P	0	0	0	0	0	0	0	0	0	0	0	55	55
2008	0	P	0	0	0	0	0	0	0	0	0	0	0	200	200
2009	-0.5	C	500	500	0	0	0	0	0	0	0	0	0	0	1,000
2009	1	C	500	500	0	0	0	0	0	0	0	0	0	0	1,000
2009	-1	P	510	500	0	0	0	0	0	0	0	0	0	0	1,010
2010	0	C	750	750	750	750	750	750	750	750	750	750	750	750	9,000
	Total		2,260	2,250	750	750	750	750	750	750	750	750	750	2,005	13,265
			Panel D: WZ Trading on May 12, 2008												
2008	0	P	0	0	0	0	0	0	0	0	0	0	0	400	400
2008	0.5	P	0	0	0	0	0	0	0	0	0	0	0	600	600
	Total		0	0	0	0	0	0	0	0	0	0	0	1,000	1,000
			Panel E: WA Trading on May 21, 2008												
2008	0.6	C	0	0	0	0	0	0	0	300	0	0	0	0	300
2008	-1.5	P	0	0	0	0	0	0	1,000	1,000	1,000	1,000	1,000	1,000	6,000
2008	-1	P	0	0	0	0	0	0	1,500	0	0	0	0	0	1,500
2008	-0.8	P	0	0	0	0	0	0	100	100	100	100	100	0	500
2008	-0.7	P	0	0	0	0	0	0	100	100	100	100	100	100	600
2008	-0.6	P	0	0	0	0	0	0	0	300	0	0	0	0	300
2008	-0.5	P	0	0	0	0	0	0	2,125	225	225	225	225	225	3,250
2008	-0.25	P	0	0	0	0	0	0	235	235	185	185	185	0	1,025
2008	0	P	0	0	0	0	0	0	0	200	0	0	0	0	200
2009	-0.1	P	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
2010	-0.5	P	500	500	500	500	500	500	500	500	500	500	500	500	6,000
2011	-0.5	P	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
	Total		2,500	2,500	2,500	2,500	2,500	2,500	7,560	4,960	4,110	4,110	4,110	3,825	43,675
			Panel F: WA Trading on February 12, 2009												
2009	-3.5	C	0	0	250	0	0	0	0	0	0	0	0	0	250
2009	-1.5	C	0	0	200	0	0	0	0	0	0	0	0	0	200
2009	-1	C	0	0	625	0	0	0	0	0	0	0	0	0	625
2009	0	C	0	0	1,125	0	275	275	0	0	0	0	0	0	1,675
2009	-8	P	0	0	1	0	0	0	0	0	0	0	0	0	1
2009	-5	P	0	0	0	0	0	350	0	0	0	0	0	0	350
2009	-4	P	0	0	201	0	0	0	0	0	0	0	0	0	201
2009	-3.5	P	0	0	100	0	0	0	0	0	0	0	0	0	100
	Total		0	0	2,502	0	275	625	0	0	0	0	0	0	3,402

Table 3 (Continued): Volumes in Selected Contracts on Selected Dates

Delivery		Strike	Call/Put	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	All
Panel G: WA Trading on September 15, 2010																
2010	-1.15	C		0	0	0	0	0	0	0	0	0	0	0	100	100
2010	-1	C		0	0	0	0	0	0	0	0	0	150	100	0	250
2010	-0.75	C		0	0	0	0	0	0	0	0	0	400	0	0	400
2010	-0.5	C		0	0	0	0	0	0	0	0	0	50	0	0	50
2010	0	C		0	0	0	0	0	0	0	0	0	0	100	0	100
2010	-5	P		0	0	0	0	0	0	0	0	0	0	4,585	0	4,585
2010	-3	P		0	0	0	0	0	0	0	0	0	0	625	0	625
2010	-2.5	P		0	0	0	0	0	0	0	0	0	170	0	0	170
2010	-2	P		0	0	0	0	0	0	0	0	0	350	825	0	1,175
2010	-1.75	P		0	0	0	0	0	0	0	0	0	0	2,575	0	2,575
2010	-1.5	P		0	0	0	0	0	0	0	0	0	1,045	500	50	1,595
2010	-1.15	P		0	0	0	0	0	0	0	0	0	0	0	100	100
2010	-1	P		0	0	0	0	0	0	0	0	0	450	0	0	450
2010	-0.8	P		0	0	0	0	0	0	0	0	0	50	50	0	100
2010	-0.75	P		0	0	0	0	0	0	0	0	0	0	250	0	250
2011	-0.8	C		200	0	0	0	0	0	0	0	0	0	0	0	200
2011	0	C		400	400	400	400	400	400	400	400	400	400	400	400	4,800
2011	-2	P		150	150	150	150	150	150	750	750	750	750	750	750	5,400
2011	-1	P		550	550	550	550	550	550	550	550	550	550	550	550	6,600
2011	-0.8	P		200	0	0	0	0	0	0	0	0	0	0	0	200
2011	-0.5	P		525	525	525	525	525	525	525	525	525	525	525	525	6,300
2012	-0.5	P		500	500	500	500	500	500	500	500	500	500	500	500	6,000
Total				2,525	2,125	2,125	2,125	2,125	2,125	2,725	2,725	2,725	5,390	12,335	2,875	41,925
Panel H: WA Trading on March 6, 2009																
2009	-2.25	C		0	0	0	150	0	0	0	0	0	0	0	0	150
2009	0	C		0	0	0	50	0	0	0	0	1000	0	0	0	1050
2009	-6	P		0	0	0	100	0	0	0	0	0	0	0	0	100
2009	-3	P		0	0	0	10	0	0	0	0	0	0	0	0	10
2009	-2.25	P		0	0	0	150	0	0	0	0	0	0	0	0	150
Total				0	0	0	460	0	0	0	0	1000	0	0	0	1460
Panel I: WA Trading on February 19, 2009																
2009	-2.25	C		0	0	0	300	0	0	0	0	0	0	0	0	300
2009	-1.5	C		0	0	25	0	200	0	0	0	0	0	0	0	225
2009	-1	C		0	0	390	0	0	0	0	0	0	0	0	0	390
2009	0	C		0	0	350	50	0	0	200	0	0	0	0	0	600
2009	1	C		0	0	500	0	0	0	0	0	0	0	0	0	500
2009	-5	P		0	0	325	0	0	0	0	0	0	0	0	0	325
2009	-4	P		0	0	325	0	0	0	0	0	0	0	0	0	325
2009	-2.5	P		0	0	1,000	0	0	0	0	0	0	0	0	0	1,000
2009	-2.25	P		0	0	0	420	0	0	0	0	0	0	0	0	420
2009	-1.5	P		0	0	25	0	200	0	0	0	0	0	0	0	225
2009	-1	P		0	0	365	0	0	0	0	0	0	0	0	0	365
Total				0	0	3,305	770	400	0	200	0	0	0	0	0	4,675
Panel J: ZA Trading on April 21, 2009																
2009	0.09	P		0	0	0	0	0	0	0	0	500	0	0	0	500
Total				0	0	0	0	0	0	0	0	500	0	0	0	500
Panel K: KD Trading on February 23, 2009																
2009	4.1	C		0	25	0	0	0	0	0	0	0	0	0	0	25
2009	4.2	C		0	100	0	0	0	0	0	0	0	0	0	0	100
2009	4	P		0	550	0	0	0	0	0	0	0	0	0	0	550
Total				0	675	0	0	0	0	0	0	0	0	0	0	675
Panel L: CD Trading on March 9, 2009																
2009	48	C		0	0	100	0	0	0	0	0	0	0	0	0	100
2009	49.5	C		0	0	500	0	0	0	0	0	0	0	0	0	500
2009	50	C		0	0	450	0	0	0	0	0	0	0	0	0	450
2009	45.5	P		0	0	50	0	0	0	0	0	0	0	0	0	50
2009	46	P		0	0	100	0	0	0	0	0	0	0	0	0	100
Total				0	0	1,200	0	0	0	0	0	0	0	0	0	1,200

Source: CFTC Volume Data Files